

The Warren Shunt in Treating Bleeding Esophageal Varices

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In patients who have impaired hepatic reserve, the Warren shunt has been proposed as an effective operation because it decompresses the esophageal varices without disturbing portal perfusion of the liver. However, early reports of high operative mortality and technical difficulties have impeded acceptance of the procedure.

The operation was done in a series of 17 patients. All patients in whom elective variceal decompression with a patent splenic vein was required and without clinical ascites were candidates for this operation. Follow-up ranged from 2 to 48 months. Six patients had alcoholic cirrhosis, two had primary biliary cirrhosis and seven had postnecrotic cirrhosis; in two the cause of the liver disease was unknown. Five patients were categorized as Child's class A, nine as class B and three as class C. No intraoperative or early postoperative deaths owing to hemorrhage occurred. However, there was one death two weeks postoperatively from pulmonary sepsis and one death five weeks postoperatively due to antigen-positive hepatitis. Two patients died from hepatic failure six weeks and five months after operation, respectively; in the first of these, chronic active hepatitis was diagnosed at the time of operation. In one patient hemorrhage recurred and transfusion was required. Although ascites, which eventually resolved, developed in eight patients after operation, the results in 76 percent of patients have been good without new episodes of hemorrhage or encephalopathy. We conclude that the Warren shunt is a safe and effective elective operation for the treatment of patients in whom hemorrhage from esophageal varices has occurred.

THE SURGICAL TREATMENT of bleeding esophageal varices by portasystemic shunting is usually successful in arresting hemorrhage but it often produces encephalopathy and has not been conclusively shown to prolong life. Although there are

several reasons for the untoward sequelae of total portal diversion, the final common pathway is probably related to diversion of most of the portal blood from an already compromised liver.

In order to minimize the incidence of hepatic failure and encephalopathy after total portal systemic diversion, selective portasystemic shunting procedures are being widely used. Although there are several types of selective shunts, the one pre-

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ESOPHAGEAL VARICES

dominantly employed in the United States is the distal splenorenal shunt proposed by Warren and associates in 1967.

Three basic principles are embodied in the Warren shunt: (1) decompression of the esophagogastric varices via the intact short gastric veins by a shunt created between the distal end of the splenic vein and the side of the left renal vein, (2) maintenance of portal perfusion of the liver and (3) portal azygous disconnection interrupting the coronary, right gastric and right gastroepiploic veins.¹²

Despite the theoretic advantages of this procedure over total portasystemic shunting, the surgical community has been slow to accept the Warren shunt. Technical difficulty in the splenic vein dissection, causing significant operative blood loss, is one reason for this reluctance. Skepticism that this "small" shunt will effectively control esophageal bleeding is another. A third reason is that ascites represents a relative contraindication to the procedure.

Since 1974 we have carried out a distal splenorenal shunt in most patients stabilized after variceal hemorrhage who have had a patent splenic vein shown on angiography and who have not had significant ascites. The distal splenorenal shunt was employed only in elective or semi-emergent cases. This report presents our experience with these 17 patients.

Patients and Methods

The series of patients, ranging in age from 15 to 64, comprised eight women and nine men. Cirrhosis was present in all patients: six had alcoholic cirrhosis, two had primary biliary cirrhosis, seven had postnecrotic cirrhosis and two had cryptogenic cirrhosis. All patients had had at least one episode of variceal hemorrhage, and most had had multiple episodes. In 15 patients preoperative endoscopy was done to confirm bleeding varices, and in all of these patients celiac and superior mesenteric angiography with venous phase visualization was carried out to determine the anatomy of the portal system, and specifically the patency of the splenic vein.

A preoperative liver biopsy was done in ten patients to rule out acute hyaline necrosis. If this pathologic diagnosis was made, operation was not considered. However, there were four patients with chronic active hepatitis at the time of operation. Classification of patients according to Child's criteria designated five as class A, nine as

TABLE 1.—Summary of Clinical Profiles

Type of Cirrhosis	Number of Patients in Child's Classifications		
	A	B	C
Alcoholic	1	4	1
Biliary	1	1	..
Postnecrotic	2	4	1
Cryptogenic	1	..	1

class B and three as class C. The prothrombin time was prolonged in ten patients. Although no significant ascites was apparent in any patient at the time of operation, approximately 50 percent of the patients had had significant ascites preoperatively. In four patients there was hepatic encephalopathy preoperatively associated with variceal hemorrhage. Clinical profiles of the entire group are summarized in Table 1.

Surgical Technique

The technique employed for the distal splenorenal shunt is essentially the method described by Warren.¹¹ However, there are several technical points worthy of note: The splenic vein must be at least 8 mm in diameter to assure long-term patency of the shunt. When dissecting the splenic vein from the inferior border of the pancreas, the small pancreatic branches should be tied in continuity and divided or clipped rather than applying clamps which tend to tear these fragile veins. It is important to dissect the splenic vein proximally enough to prevent kinking when the anastomosis is constructed. Excision of a wedge of retroperitoneal tissue between the splenic and renal veins will also facilitate a gentle arc of the splenic vein for an unobstructed anastomosis. In our experience, utilization of the Blalock clamp on the divided splenic vein affords added maneuverability in carrying out the anastomosis. Finally, we are in complete agreement with Warren that the anterior row of the anastomosis should be interrupted to prevent a purse-string effect.¹¹ Once the anastomosis is finished, it is imperative to effect a complete portoazygous disconnection. This entails ligation of the right gastric, umbilical right gastroepiploic, and coronary veins. Special care must be taken when dividing the coronary veins because failure to accomplish this can cause postoperative hemorrhage or encephalopathy.¹⁴

Results

Postoperative Survival

Patient follow-up has been excellent in all but one survivor, ranging from 2 to 48 months (mean,

27 months). Although four deaths have occurred in this series, none was attributable to intraoperative bleeding or recurrent variceal hemorrhage. One patient, a Child's class C, died within 30 days of operation. The operation was urgently done for continued bleeding resistant to intravenous vasopressin and balloon tamponade. The patient was recovering from aspiration pneumonia when bleeding began again and was taken to surgery. He died of pulmonary sepsis eight days postoperatively.

There were three late deaths—occurring five weeks, six weeks and five months postoperatively—caused by an antigen-positive fulminating hepatitis, progressive liver failure (in a patient with chronic active hepatitis) and hepatorenal syndrome, respectively. In all of the patients mild upper gastrointestinal bleeding occurred as a terminal event. The data concerning these postoperative deaths are summarized in Table 2.

Postoperative Complications

Among the complications in the surviving patients, ascites has been predominant. In seven patients ascites developed after operation and cleared within two months. One patient (previously reported) had intractable chylous ascites which gradually subsided after nine months of medical management.

Encephalopathy has not been a problem, although two patients had acute encephalopathy in the immediate postoperative period that was easily controlled with neomycin. None has had chronic encephalopathy characterized by persistent neuropsychiatric symptoms such as flapping tremor, alterations in sleep rhythms or mental deterioration. Normal activities were resumed in most cases; in fact, two patients functioned effectively in accounting positions.

Approximately 40 percent of the patients had preoperative evidence of hypersplenism with leukopenia or thrombocytopenia (or both); postoperatively, no consistent alteration in the state of hypersplenism was seen after distal splenorenal shunting.

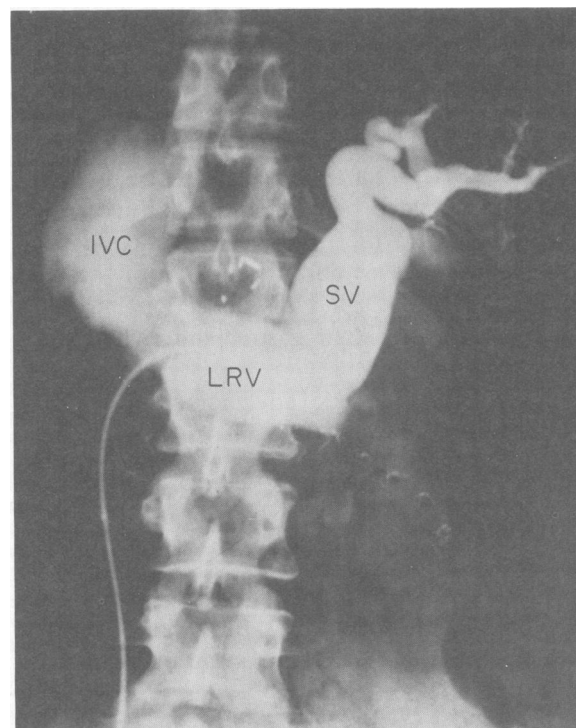


Figure 1.—Angiogram of distal splenorenal shunt. Catheter is in left renal vein. IVC=inferior vena cava. LRV=left renal vein. SV=splenic vein.

To date none of the survivors in this series has had significant upper gastrointestinal hemorrhage. One patient had a small hemorrhage on two occasions (5 months and 12 months postoperatively) which was treated conservatively and diagnosed by endoscopy as gastritis. Postoperative evaluation of varices by upper gastrointestinal series in most patients had disclosed that although varices persist for a significant period of time after operation (6 to 12 months), they eventually decrease in size.

Postoperative angiography has been done in 25 percent of patients; in all cases the shunt was shown to be patent and even significantly larger in diameter with dilatation of the splenic vein (Figure 1).

Comments

A patient in whom gastroesophageal varices develop has a 50 percent to 80 percent chance

TABLE 2.—Postoperative Deaths

Death	Child's Class	Operation	Cirrhosis	Cause of Death
Operative ..	C	Emergent	Alcoholic	Pulmonary sepsis and failure
Late	B	Emergent	Alcoholic	Antigen positive hepatitis
Late	B	Elective	Postnecrotic and chronic active hepatitis	Hepatic failure
Late	C	Emergent	Postnecrotic	Hepatic failure and hepatorenal syndrome

of dying with the first variceal hemorrhage, and after the first hemorrhage the prognosis fails to improve.¹³

Despite the effectiveness of portacaval shunting in controlling variceal hemorrhage, its efficacy in prolonging survival has been clearly disclaimed in three prospective randomized studies.^{4,6,7} These controlled studies have shown that patients with shunts die of liver failure while the medically treated patients succumb to bleeding. Indeed, the incidence of hepatic encephalopathy was approximately equal in the medically and surgically treated groups. However, severe disabling chronic encephalopathy is more common in those patients who were treated with portasystemic shunt. In a 26-year experience with 404 patients, Voorhees and co-workers⁹ found that for surgical cases followed for a period of five years or longer the incidence of encephalopathy was 57 percent.

The concept of the selective distal splenorenal shunt was based on the premise that by maintaining portal venous perfusion and selectively decompressing the gastroesophageal varices, bleeding could be controlled and encephalopathy substantially decreased. This has been borne out in three series of patients in whom the incidence of encephalopathy has been less than 5 percent with a follow-up of 96 months.^{2,3,8} This reduction in clinical encephalopathy has been correlated with measurements of maximum urea synthesis.¹⁰ Warren showed that in patients who have had portacaval shunts, maximum urea synthesis rates are significantly reduced shortly after operation, while in those who are treated with the distal splenorenal shunt there is little change. Our own clinical experience has verified this low incidence of encephalopathy after the selective Warren shunt.

Skepticism regarding the Warren shunt as an effective means of preventing recurrent hemorrhage has proved to be unjustified. In previously published series,^{2,8,11} as in our experience, documented recurrent variceal hemorrhage has not been apparent, thereby indirectly attesting to the fact that the distal splenorenal shunt is not only large enough to decompress the varices but also has long-term patency. Postoperative angiography obtained in the series reported by Thomford⁸ and in our series showed an open shunt in all patients in whom an angiogram was done. Radiographic disappearance of varices in our patients was slow despite the lack of recurrent hemorrhage, a phenomenon previously reported by Hutson and associates.²

Carlson and Ehrenfeld¹ described a patient who had recurrent variceal hemorrhage 28 months after a successful Warren shunt; however, in this case the rebleeding may have stemmed from an enlarged coronary vein which was not interrupted at the time of operation. The necessity of carrying out a complete portal-azygous disconnection at the time of shunting has been emphasized by Warren.¹¹ Failure to completely separate the portal and gastroesophageal areas into two distinct venous water sheds can lead to recurrent hemorrhage and encephalopathy (written communication, 1977, Robert Zeppa, MD, Chairman, Department of Surgery, University of Miami School of Medicine).

Technically, the Warren shunt is a demanding procedure and may take twice the operating time that a portacaval or interposition mesocaval shunt requires, and therefore it has not been recommended for use in cases of uncontrollable massive variceal hemorrhage. In cases where bleeding is slowed but an emergent operation is indicated, the Warren shunt should be considered only if the patient's condition is stable enough for adequate preoperative evaluation to be done, including visceral angiography with venous phase visualization. This is particularly important if reversed portal flow is documented because in such a situation the benefits of the distal splenorenal shunt in preserving hepatoportal flow cannot be realized and a more expeditious shunt procedure must be employed.

Before carrying out a distal splenorenal shunt, adequate preoperative evaluation and preparation of the cirrhotic patient is mandatory. In a patient who is bleeding, initial attempts at pharmacologic control of the portal hypertension with or without the addition of balloon tamponade should be made. In more than 80 percent of our patients, successful temporary control of the bleeding could be obtained, allowing time to improve the patients' conditions. This entails providing nutrition orally, or with restricted sodium l-essential amino acid parenteral feeding; using gentle diuresis to control ascites; controlling acid base and electrolyte abnormalities (especially hypokalemic alkalosis which potentiates the development of encephalopathy) and carrying out a preoperative liver biopsy to rule out acute hyaline necrosis. If acute hyaline necrosis is present, it contraindicates operation because mortality has been shown to exceed 80 percent in such cases.⁵ It must be emphasized that medical preparation is an essen-

tial feature in the management of patients who are scheduled for a distal splenorenal shunt inasmuch as the risk of this operation, like that for portacaval shunts, is determined largely by the patient's preoperative status.

The findings in our small series of distal splenorenal shunts as well as those of larger series reported in the literature^{2,8,11} have suggested that the Warren shunt can be done with an operative mortality as low as that of a total shunt. Moreover, it is equally as effective as the total shunt in preventing recurrent hemorrhage and has a lower risk of encephalopathy than the total shunt. Whether the Warren shunt will prolong life in cirrhotic patients in whom hemorrhages have occurred is not known because no substantial randomized studies comparing medically treated patients with those in whom Warren shunts were done have been reported. However, in a series of 42 patients with postnecrotic cirrhosis in whom distal splenorenal shunt was done, Zeppa¹⁴ reported an 88 percent probability of survival for six years calculated on an actuarial basis. This is at least twice the rate reported for patients with postnecrotic cirrhosis treated with a total shunt. On the other hand, the survival rate of alcoholic patients was no better than in those treated

with a total shunt. These preliminary data suggest that postnecrotic cirrhotic patients may represent a subset of patients in whom there is prolonged survival following distal splenorenal shunt.

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Patients at Risk for Nodular Goiter

IN IDENTIFYING the patient at greatest risk, bear in mind that the neoplasm is more likely to occur in younger patients. It has a higher incidence in the male, and is of more concern in the patient who has a solitary nodule as opposed to multiple nodules, if it's solid and nonfunctioning. I try to differentiate between the patient who has a nonfunctioning or cold nodule and a patient who has one that's warm. This is not always easy to do, but if it's truly cold it places that person at a higher risk; if it's truly warm, it's probably not cancerous.

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